

09/973,778

Art Unit: 1731

Submission under 37 CFR 1.114

Amendments to the Claims

Please amend the claims as follows. This listing of the claims will replace all prior versions, and listings of claims, in the application:

- 1) (currently amended) A method of reducing stress-induced mechanical problems in optical quality components having a plurality of layers with different refractive indices, comprising carrying out the following steps in sequence:
 - i) fabricating a first structure resistant to wafer warp during thermal processing by PECVD (Plasma Enhanced Chemical Vapor Deposition), said first structure comprising a depositing silica buffer layers respectively on a front and back face of a silicon wafer having a first silicon nitride layer on a front face thereof, a first buffer layer on said first silicon nitride layer, a second buffer layer on a back face of said wafer, and a second silicon nitride layer under said second buffer layer by PECVD (Plasma Enhanced Chemical Vapor Deposition) to provide a first structure resistant to wafer warp during thermal processing;
 - b) reducing optical absorption and compressive stress in said buffer layers by subjecting said first structure to a first thermal treatment, said first thermal treatment comprising:
 - i) stabilizing a diffusion tube at an initial stabilization temperature lying between 300°C and 700°C;
 - ii) inserting said first structure into said diffusion tube of step b(i);
 - iii) stabilizing said first structure at said initial stabilization temperature;
 - iv) decreasing compressive stress in said buffer layers from an initial compressive value by subjecting said first structure to a temperature that ramps up from a said initial stabilization temperature to a constant temperature of at least between 800°C and 1300°C;
 - v) further decreasing compressive stress in said buffer layers and reducing optical absorption by continuing to subject said first structure to said constant temperature of at least 800°C for a period of at least 30 minutes; and
 - vi) causing said first structure to undergo an elastic deformation wherein the compressive stress in said buffer layers increases linearly to a final compressive value that is less

09/973,778

Art Unit: 1731

Submission under 37 CFR 1.114

than said initial compressive value by ramping down said temperature to which said first structure is subjected to a final stabilization temperature; and

vii) extracting said first structure from said diffusion tube of step b(i) at said final stabilization temperature thereof;

c) depositing a silica core layer on said buffer layer on said front face of the wafer by PECVD to form a second structure;

d) reducing optical absorption and tensile stress in said core layer by subjecting said second structure to a second thermal treatment, said second thermal treatment comprising:

i) stabilizing a diffusion tube at a temperature at an initial stabilization temperature lying between 300°C and 700°C;

ii) inserting the second structure into said diffusion tube of step d(i) at said initial stabilization temperature;

iii) relieving tensile stress in said core layer from an initial tensile value by subjecting said second structure to a temperature that ramps up to a constant temperature of at least between 600°C and 1300°C;

iv) reducing optical absorption by continuing to subject said second structure to a said constant temperature of at least between 600°C and 1300°C for a period of at least 30 minutes; and

v) causing said second structure to undergo elastic deformation and said tensile stress in said core layer to decrease linearly to a final tensile value that is less than said initial tensile value by ramping down said temperature to which said second structure is subjected to a final stabilization temperature;

vi) extracting said second structure from the diffusion tube of step d(i) at said final stabilization temperature thereof; and

e) depositing a cladding layer over said core layer.

2.(cancelled)

3.(cancelled)

09/973,778

Art Unit: 1731

Submission under 37 CFR 1.114

- 4.(previously presented) A method as claimed in claim 1, wherein said first structure is maintained at said stabilization temperature for a period of from 1.3 to 130 minutes.
- 5.(previously presented) A method as claimed in claim 1, wherein said first structure is maintained at said stabilization temperature for a period of about 13 minutes.
- 6.(currently amended) A method as claimed in claim 1, wherein in step b(i) the temperature of said first structure is ramped up from said stabilization temperature to said temperature of at least 800°C at a rate lying in the range 1°C/min to 25°C/min.
- 7.(previously presented) A method as claimed in claim 6, wherein said rate is 5°C/min.
- 8.(previously presented) A method as claimed in claim 1, wherein said stabilization temperature lies in the range 300°C to 700°C.
- 9.(previously presented) A method as claimed in claim 1, wherein said stabilization temperature is about 400°C.
- 10.(currently amended) A method as claimed in claim 8, wherein in step b(iii) the temperature of said first structure is ramped down to said final temperature at a rate in the range 1°C/min. to 25°C/min.
- 11.(previously presented) A method as claimed in claim 10, wherein said rate is 2.5°C/min.
- 12.(currently amended) A method as claimed in claim 1, wherein in step b(ii) the temperature of at least 800°C to which said first structure is continued to be subjected for at least 30 minutes lies in the range of 800°C to 1,300°C.
- 13.(currently amended) A method as claimed in claim 1, wherein in step b(ii) the temperature of at least 800°C to which said first structure is continued to be subjected is 900°C.
- 14.(previously presented) A method as claimed in claim 1, wherein said first and second thermal treatments are carried out in the presence of an inert gas.
- 15.(currently amended) A method as claimed in claim 1, wherein said first and second treatments are carried out in the presence of a gas selected from the group consisting of:

09/973,778

Art Unit: 1731

Submission under 37 CFR 1.114

nitrogen, oxygen, hydrogen, water vapour, argon, fluorine, carbon tetrafluoride, nitrogen trifluoride, and hydrogen peroxide.

16.(previously presented) A method as claimed in claim 14, wherein said inert gas has a constant flow rate.

17.(previously presented) A method as claimed in claim 16, wherein said flow rate of said inert gas lies in the range 1 liter/min. to 100 liters/min.

18.(currently amended) A method as claimed in claim 1, wherein in step d(ii) the temperature of at least 600°C to which said second structure is continued to be subjected lies in the range 600 to 1300°C.

19.(currently amended) A method as claimed in claim 18, wherein in step d(ii) the temperature of at least 600°C to which said second structure is continued to be subjected is 900°C.

20.(canceled)

21.(canceled)

22.(cancelled)

23.(cancelled)

24.(previously presented) A method as claimed in claim 1, wherein a protective layer is deposited on the back face of the buffer layer on the back side of the wafer and a compensating layer is deposited on the front face of the wafer.

25.(previously presented) A method as claimed in claim 24, wherein the protective layer and compensating layer are silicon nitride.

26.(cancelled)

27.(cancelled)

28. (cancelled)

29.(cancelled)

09/973,778

Art Unit: 1731

Submission under 37 CFR 1.114

30.(cancelled)

31.(cancelled)